INTEX-B: Flight 12 (Hawaii Local 2; April 25, 2006; Tuesday)

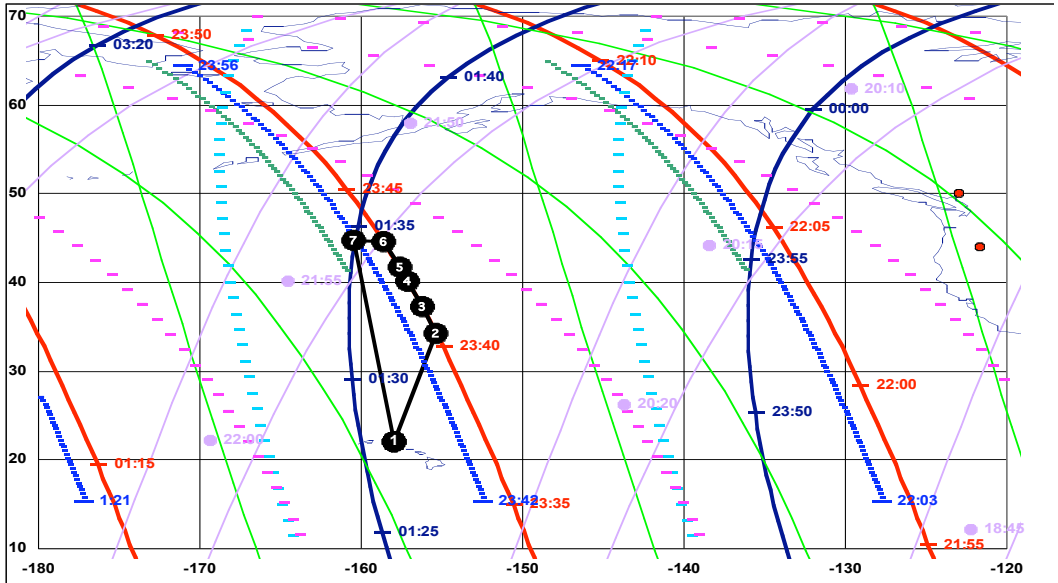
This was the 10th INTEX-B science flight and the second local Flight from Hawaii. The principal DC-8 objectives for this flight were sampling of aged and fresh Asian pollution over the Pacific and validation of MLS and TES observations. The nominal flight tracks and profiles for the DC-8 are shown in slides 2 but these were somewhat modified in-flight to avoid significant cloud bands, and to accommodate ATC restrictions. The major pollution features expected along the flight paths are shown in slide 3. Takeoff time for the DC-8 was 9:45 am (LT) and the flight duration was 9 hours.

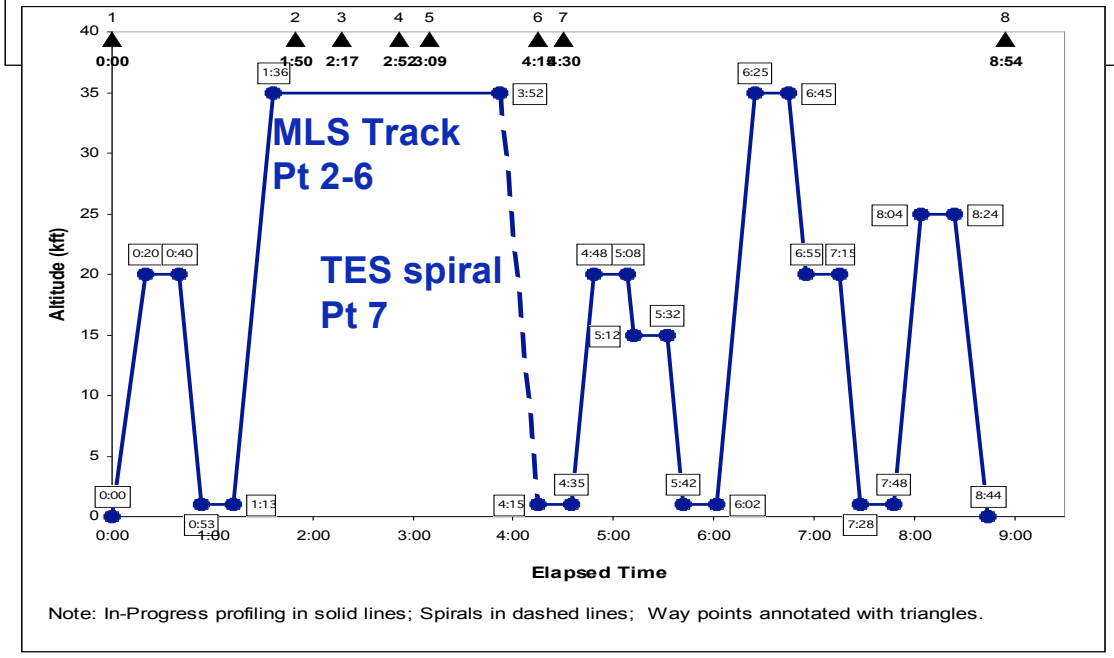
Most of the instruments aboard the DC-8 performed normally throughout the flight and atmospheric conditions were favorable for achieving stated objectives. Two major weather systems affected Flight 12. High pressure (the subtropical high) was centered near 35N, 140 W at the surface—northeast of the Honolulu. The second major system was a double barreled low center located 1) over the Gulf of Alaska and 2) over the central Aleutians. The polar branch of the jet stream stretched along the northern most part of the flight track. More specifically, the entrance region of a well defined jet streak was located at this northern most point. The DC-8 encountered westerly winds as strong as 140 kt in this area. Widespread deep, multi-layer clouds stretched in advance of the northeast-southwest frontal system noted above. This cloud band corresponded to the warm conveyor belt of that system, carrying tropical low level air northeastward into higher altitudes and latitudes. A second area of clouds was located very near Honolulu. As a result of these weather systems, some of the Flight 12 track encountered clouds at multiple levels.

This was a successful flight and we were able to meet all our main objectives. The DC-8 climbed out of Hickam in the northeasterly direction to randevouz with the MLS track at a high altitude. During initial climb mid-tropospheric pollution was encountered and sampled at 20 Kft (see slide 4). The DC-8 subsequently descended to the surface sampling and profiling before climbing to 32 Kft to randevouz with the MLS track at 2150 UT. Once again scattered pollution layers were seen throughout the troposphere. The MLS track began at 32 Kft and we remained there for about 1 hour until permission was granted by ATC to ascend to 33 K ft. The MLS track encountered high level of pollution with CO and O_3 both exceeding 100 ppb increasing as the DC-8 moved north (CO-150 ppb). All nitrogen species such as NO_x, HNO_3, PANs were extremely low (<50 ppt) at the start of the MLS track but increased northwards where all exceeded 100 ppt. There were indications that HNO_3 was lost on cirrus clouds. The DC-8 under flew the MLS track all the way to the northerly point 6 and turned west at a high altitude to cross a front and randevouz with the TES overpass at point 7. The TES spiral (33-0.5 Kft) was initiated at 2345 UT. Pollution levels behind the front were quite high and O_3 appear to jump by 40 ppb. Mixing ratios of CO and O_3 during the TES spiral were rather large with CO approaching 200 ppb and O_3 exceeding 100 ppb. These air masses contained substantial concentrations of SO_2 and SO_4 (200-300 ppt) as well as PANs and OVOC throughout this column. There were indication of dust (super-micron particles with high depolarization) at about 10-15 Kft. Backward trajectories showed that air from southern Asia followed a relatively direct west to east path across the Pacific to the flight track. Heading south towards Honolulu the DC-8 sampled pollution and dust at various levels sampling and profiling the troposphere in rather cloudy skies before landing at Hickam AFB..

ICATS archived data files for INTEX-B are available at: http://www.nasa.gov/centers/dryden/research/AirSci/DC-8/ICATS/FY06/INTEX-B/index.html

DC-8 Flight 12-Hawaii Local 2- (4/25/06; Tuesday)





Note: In-Progress profiling in solid lines; Spirals in dashed lines; Way points annotated with triangles.

OBJECTIVES:

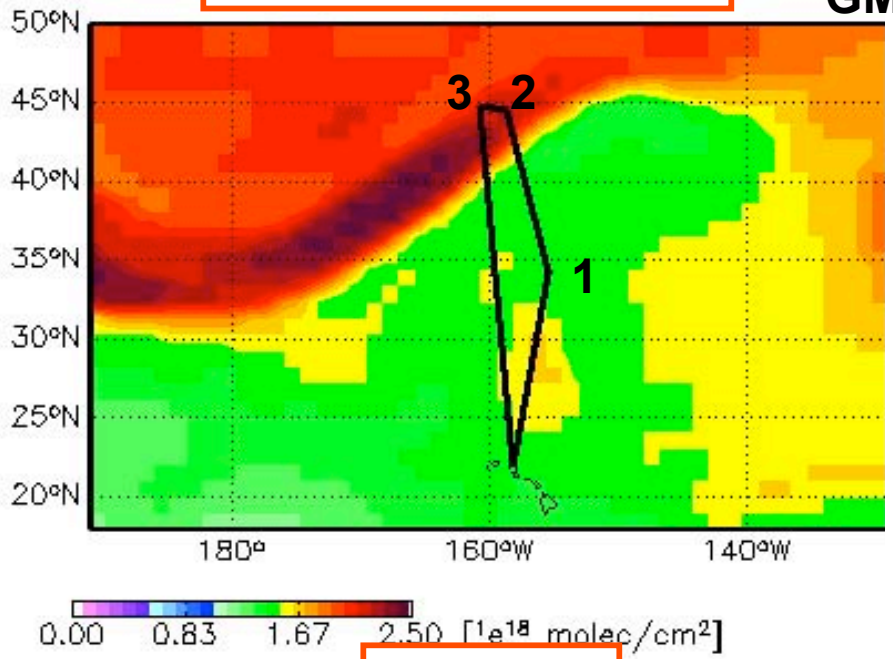
- Fresh Asian pollution North of 40 N
- Aged Asian pollution south of 40 N
- MLS/TES validation

Take off: 9:45 am LT

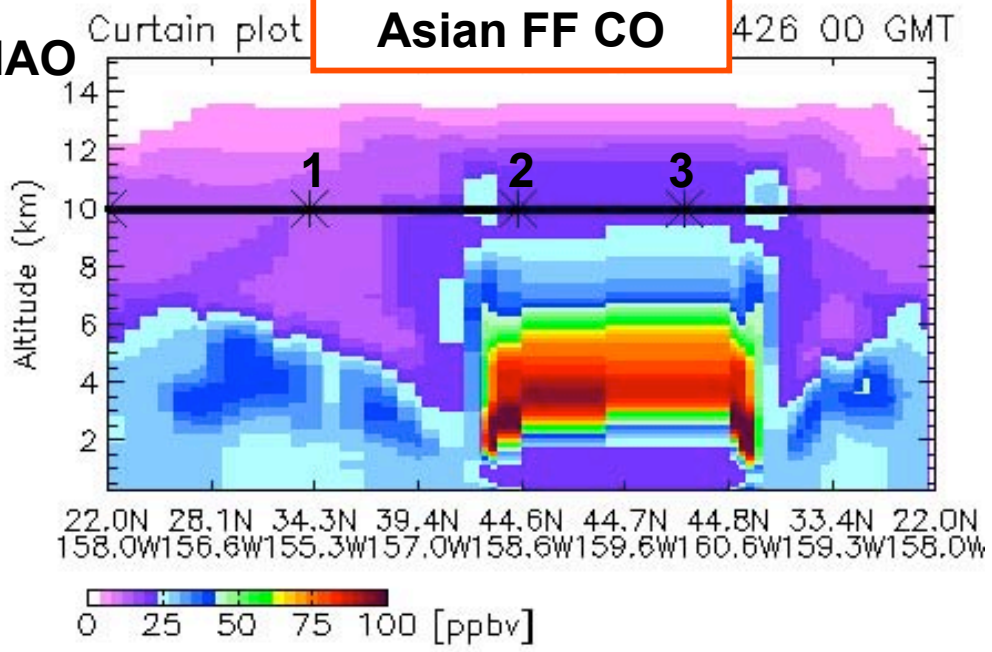
Flight time: 9 hours

Total CO Column

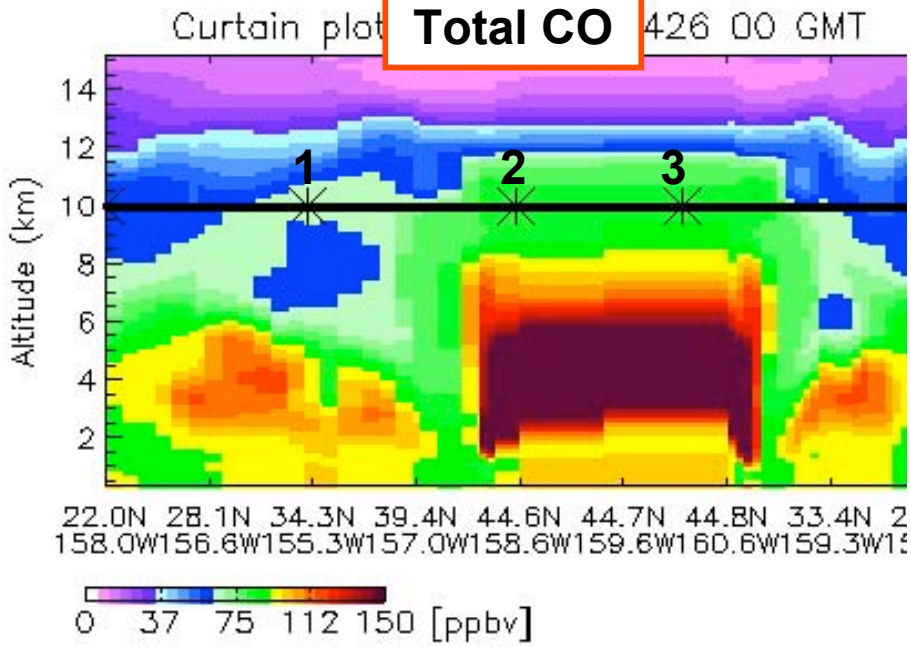
GMAO



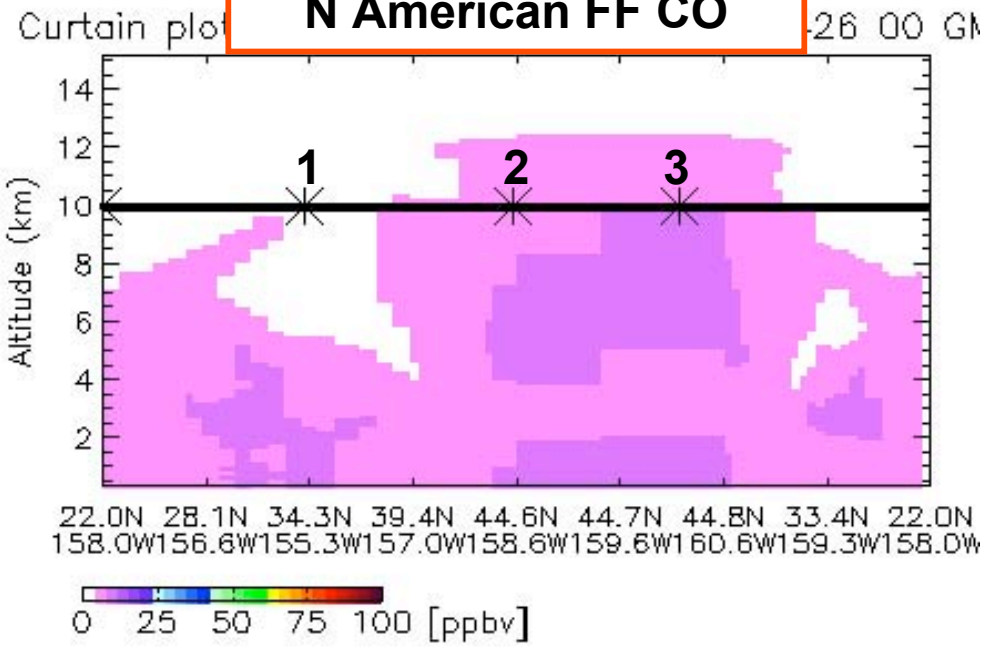
Asian FF CO



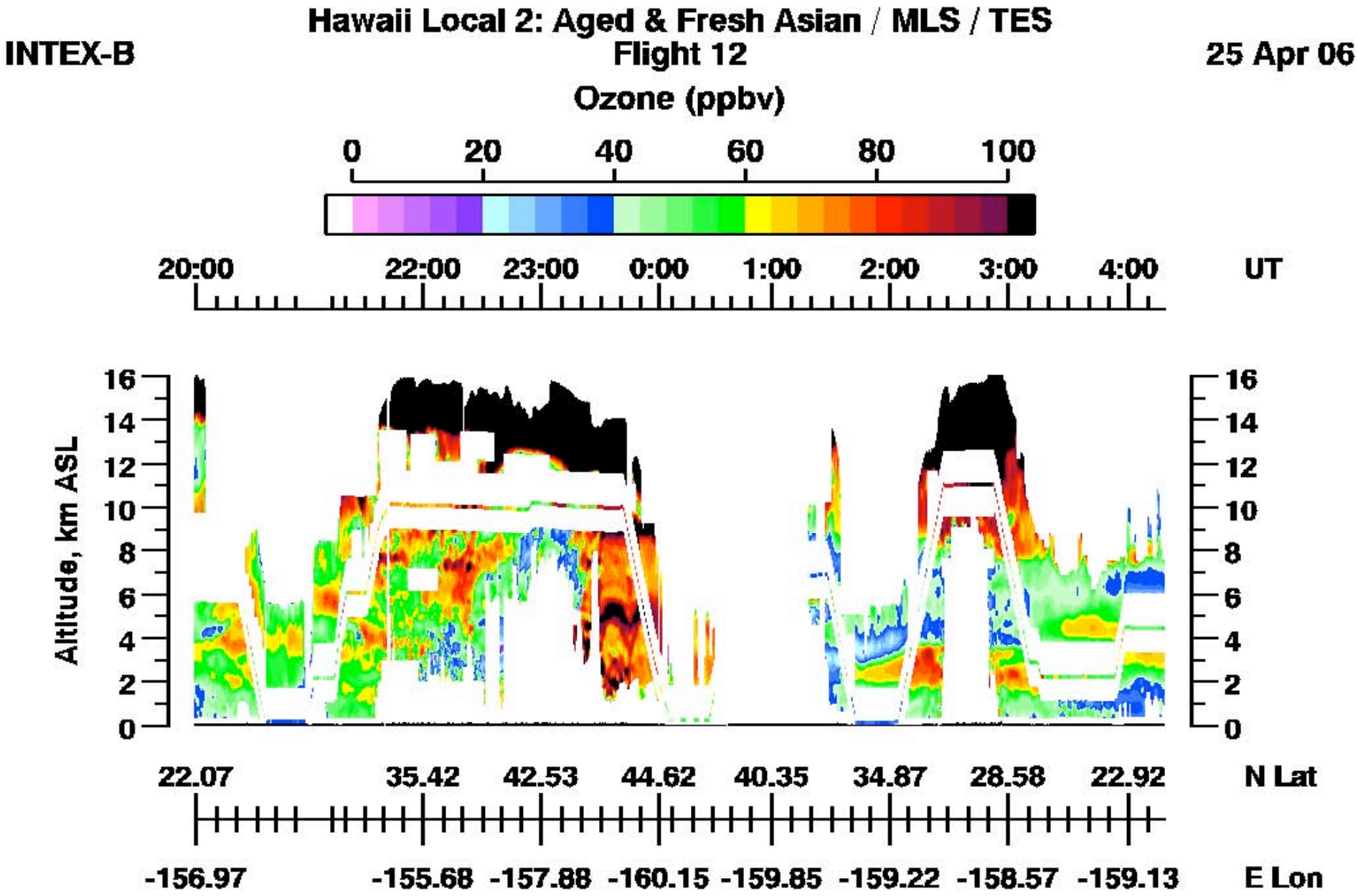
Total CO



N American FF CO



Initialized 4/25 0Z


Hawaii Local 2: Aged & Fresh Asian / MLS / TES
INTEX-B
Flight 12
25 Apr 06
Ozone (ppbv)
0
20
40
60
80
100
20:00
22:00
23:00
0:00
1:00
2:00
3:00
4:00
UT
Altitude, km ASL
16
14
12
10
8
6
4
2
0
22.07
35.42
42.53
44.62
40.35
34.87
28.58
22.92
N Lat
-156.97
-155.68
-157.88
-160.15
-159.85
-159.22
-158.57
-159.13
E Lon